

Maintenance and Operations Tasks Accomplished at DSS 12 During the Antenna Panel Replacement Downtime

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The heavy schedule of tracking activities at the Echo Deep Space Station (DSS 12) prevents some time-consuming maintenance tasks from being performed. Careful coordination prior to and during a mandatory task (antenna panel replacement) made it possible to do a large number of unrelated tasks that ordinarily would have to be deferred. It is not the intent to relate the activities of the antenna panel replacement but to describe the maintenance and operations tasks accomplished during the downtime.

I. Introduction

An eight-week period, from 22 February to 19 April 1981, was set aside to correct antenna gain deficiencies in the 34-meter antenna at Goldstone, California. To take advantage of the station availability during the antenna downtime, the Goldstone Maintenance and Integration Unit worked closely with DSN Engineering (Section 355). This coordination made time available to do things that would not normally be done because of the heavy tracking commitments.

II. Maintenance Activities

The following maintenance and operations tasks were accomplished during the antenna panel replacement downtime:

- (1) Seven Engineering Change Orders were implemented:

Number	Title	Subsystem
79.006	Symbol Synchronizer Assembly Upgrade	40.3
79.152	Host Processor Installation	Various
79.159	Radio Frequency Power Supply Monitor	2.1
79.269	High Voltage Cable Isolation	2.0
79.272	Angle Encoder Translator Damage	6.7
79.292	Add Radiometer Experiment	Various
80.205	Generator Control Logic Modification	39.2

- (2) Corrective maintenance had to be carefully scheduled and accomplished on a not-to-interfere with the antenna panel replacement work basis.
 - (a) All Frequency and Timing System cables were checked and rerouted to eliminate a long standing problem of intermittent failures. Included in this work was the retermination of system ground cables to reduce ground loop problems that had existed for years.
 - (b) The coolant lines at the 20-kW S-band transmitter were disassembled and resealed to prevent leaks.
 - (c) The hour angle and declination axes cable wraps were reworked to eliminate existing and future cable damage.
 - (d) Defective wiring in the backup S-band maser control cable was repaired by using spare wires within the existing cable.
 - (e) A large amount of corrective maintenance was accomplished on the Digital Instrumentation Assembly.
- (3) Workmanship Assurance Discrepancy Report work. During the antenna downtime, 26 discrepancy reports, containing a total of 59 separate items, were corrected and cleared. Deep Space Station 12 is now at an alltime low in the number of outstanding Workmanship Assurance Discrepancy Reports.

(4) Systems Testing:

- (a) To prepare for expected DSN support of the International Sun-Earth Explorer III (ISEE-3) satellite ranging compatibility tracks, the power klystron from the 20-kW transmitter was removed and tested at the Goldstone Microwave Test Facility. Data for retuning the klystron were obtained to permit rapid frequency changing during later operational testing.
- (b) Following the completion of the antenna panel work, seven radio source star tracks were carried out to determine antenna gain and to realign the antenna subreflector for optimum performance.
- (c) To assure full and complete performance of all station systems, a complete set of System Performance Tests (SPTs) was performed for telemetry, command and radio metric data.

III. Summary

With careful planning and coordination with the Engineering Task Manager, time-consuming maintenance tasks were accomplished during the major downtime activity. These tasks could not have been accomplished during the normally scheduled short maintenance periods because of tracking commitments. All scheduled maintenance and operations activities were successfully accomplished on schedule.